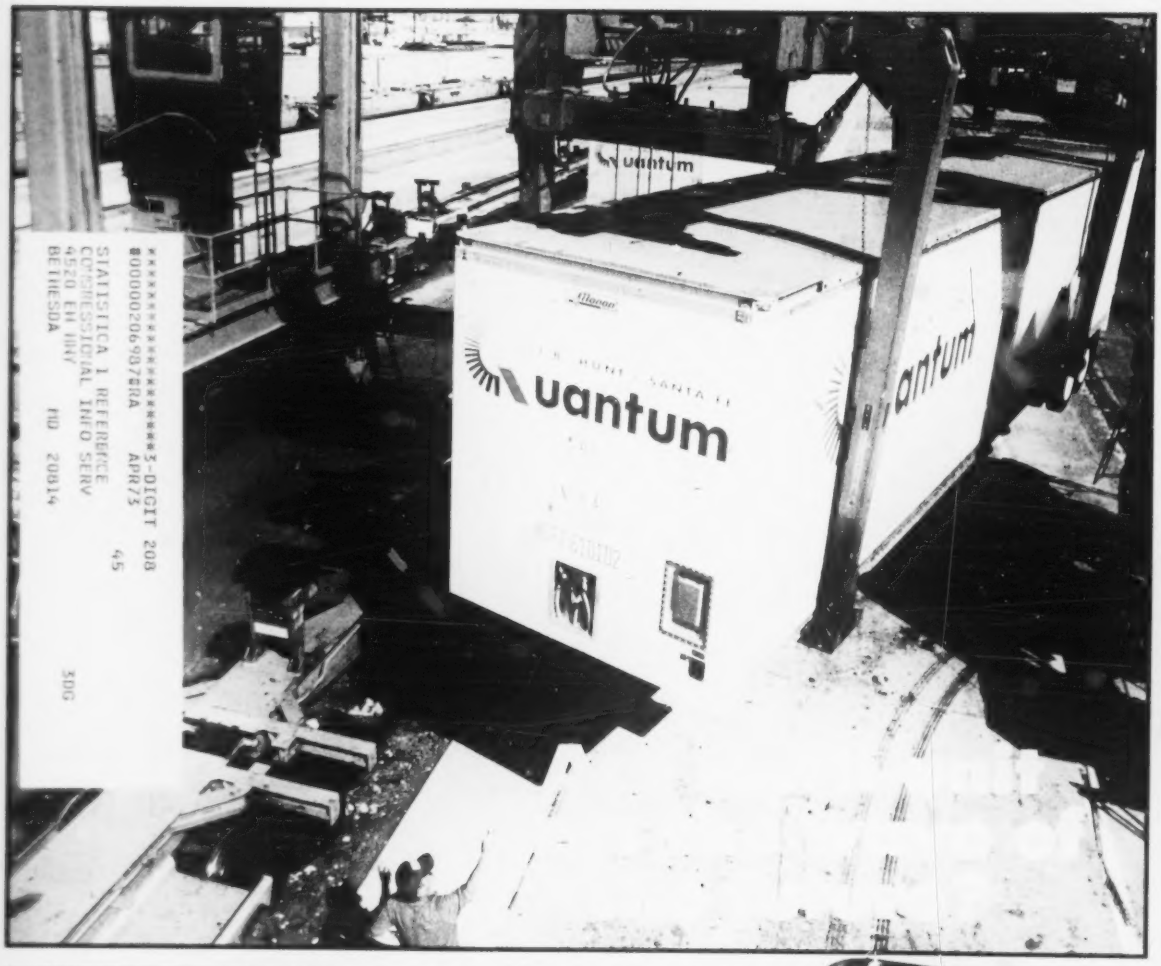
October 1990

Railway Age

...for the new age of railways and rail transit



What's behind the bi-level boom

Saving fuel: Here's how

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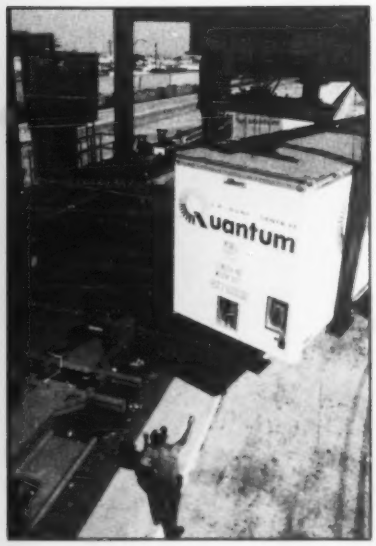
Features



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MARKET OUTLOOK

Equipment

Australian National Railway: Has received the first of 14 new diesel-electric locomotives, based on the General Electric Dash-8 technology, ordered from the Australian builder, A Goninan. The order is valued at $25 million. Goninan has announced that it will design GE-technology locomotives for the whole southeast Asian region.

Chicago Central & Pacific: Under a 15-year contract valued at $25 million, Utility Fuels Inc. of Houston will supply and maintain 220 coal hopper cars for CCP. CCP will use the combination rotary and bottom dump cars to move coal from Wyoming's Hanna Basin to generating plants in the Chicago area. UFI, a subsidiary of Houston Industries Inc., currently owns and operates more than 2,300 cars which transport coal from Wyoming to Texas.

CSX Transportation: Placed an order with Bethlehem Steel's Freight Car Division for 550 50-foot, 5,300-cubic-foot capacity, high-side coke cars. Delivery is to begin in October (Details, p. 20.)

Norfolk Southern: Placed an order for an additional 50 Amtech reader systems for fourth quarter delivery, bringing to 241 the number of such systems ordered by NS since December 1988. More than 4,000 tags have been installed and are being utilized for locomotive tracking and end-of-train monitoring.

San Diego Trolley: Plans a multi-year purchase of 100 new light rail cars similar in design to the 71 cars in its present fleet, all of which were supplied by Siemens-Duewag. The first of the new cars are to be delivered in the fall of 1992. While not specifying a builder, the Metropolitan Transit Development Board in its Sept. 5 announcement said it would follow a standard two-step procurement procedure.

Southern Company Services: Ordered W.H. Miner Division's AutoMac® single linkage bottom discharge systems to be installed on 546 new aluminum coal unit train cars being acquired from Thrall Car. Miner Crown S.E. draft gears have also been specified for the cars, which will be assigned to Alabama Power Co.

Union Pacific: Ordered 100 liquid tank containers for its intermodal domestic BulkTainer service. UP will acquire 75 6,300-gallon and 25 5,600-gallon IMO-1 containers at a cost of $3.5 million, with deliveries to be completed by next January.

Revenue freight carloadings

Commodity	Sep. 15 week	Sep. 8 week	Sep. 1 week	Aug. 25 week	Aug. 18 week
Grain	26,857	22,363	26,917	27,527	26,750
Other farm products	1,765	1,004	935	861	869
Metallic ores	16,089	16,254	17,840	17,260	17,014
Coal	137,979	121,718	133,158	134,789	132,319
Crushed stone, gravel and sand	16,779	14,134	16,326	16,868	16,796
Nonmetallic minerals	10,232	8,421	9,573	8,880	8,564
Grain mill products	10,273	9,418	10,554	9,972	10,308
Food and kindred products	8,811	7,548	8,811	8,468	8,740
Primary forest products	10,095	8,336	9,967	9,630	9,666
Lumber and wood products	6,089	4,815	6,631	6,164	5,895
Pulp, paper and allied products	10,212	10,374	10,714	9,882	10,381
Chemicals and allied products	28,519	26,279	29,414	29,449	28,660
Petroleum products	5,777	5,185	5,625	5,605	5,311
Stone, clay and glass products	10,804	9,381	10,683	10,386	10,700
Coke	5,992	5,746	6,066	5,925	6,166
Metals and products	10,556	8,688	10,944	10,455	10,344
Motor vehicles and equipment	19,684	15,428	17,611	17,125	15,651
Waste and scrap materials	9,354	7,027	8,873	9,038	8,650
All other carloads	7,266	5,735	7,481	6,728	6,367
Total Cars Loaded	**353,133**	**307,854**	**348,123**	**345,011**	**339,151**
% change from previous year	2.4	.1	(1.6)	(.8)	(1.3)

		% change
Cumulative total: 37 weeks	12,490,627	1.2

Estimated revenue ton-miles (billions)	21.5	18.6	21.1	21.0	20.6
% change from previous year	5.9	3.3	1.9	2.4	1.5

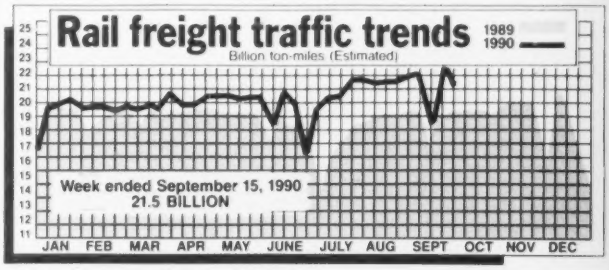
Total:	**1990**	**1989**	**% change**
37 weeks	739.1*	713.4	3.6

*revised to reflect reported ton-miles for 1st and 2nd Quarter 1990

Intermodal traffic

	Sep. 15	Sep. 8	Sep. 1	Aug. 18	
Trailers	70,072	58,425	69,442	66,038	64,074
Containers	57,361	47,773	55,261	57,167	56,203
Total	**127,433**	**106,198**	**124,703**	**123,205**	**120,277**
% change from previous year	4.7	6.8	2	5.7	3.1

		% change
Cumulative total: 37 weeks	4,340,026	3.6

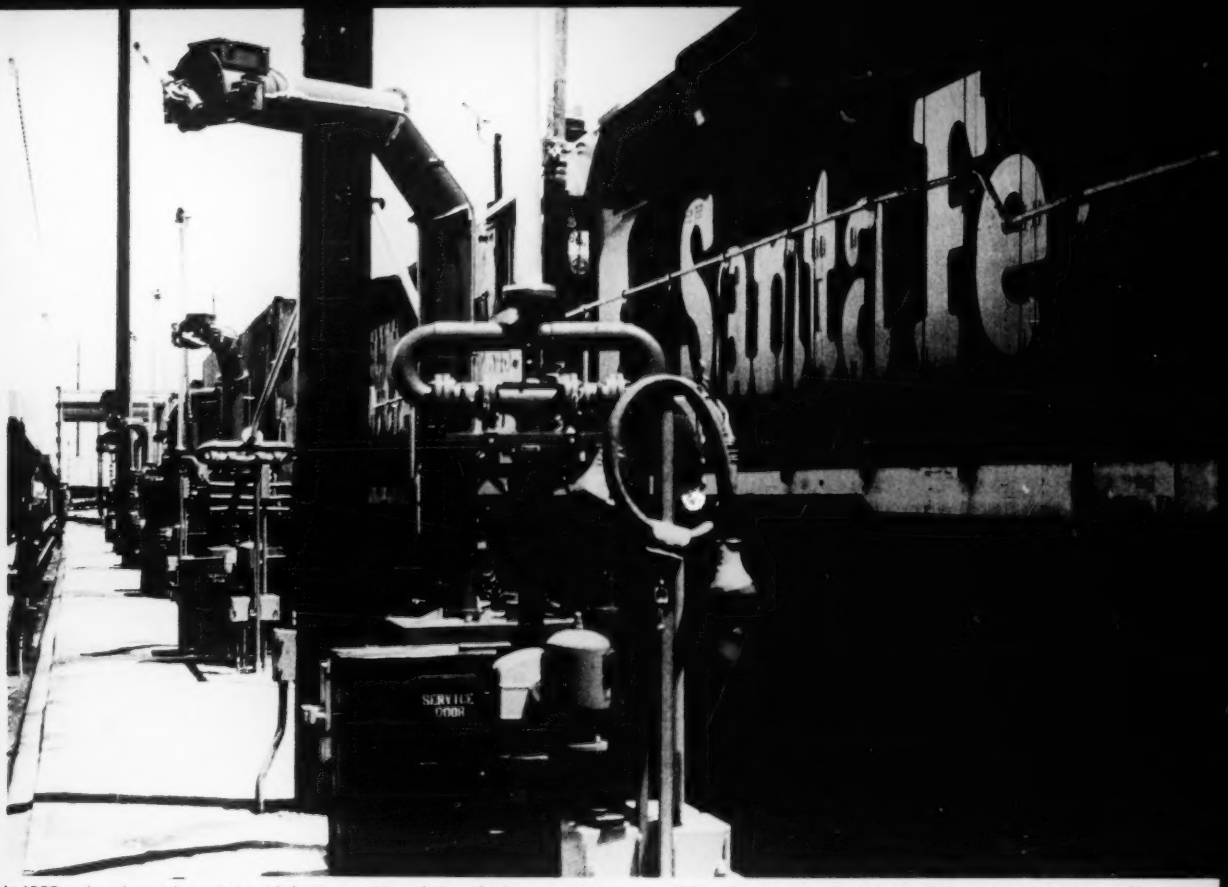


Source: Association of American Railroads

Facilities

London Underground Ltd.: Awarded an 18-month, $5 million contract to ICF Kaiser Engineers of Oakland, Calif., and the British firm of Acer Consultants Ltd. to provide electrical and mechanical design engineering services for a proposed $2 billion, 10 mile extension of London's Jubilee subway line.

Memphis Area Transit Authority: Will use a $50,000 grant from the Federal Railroad Administration to help pay for a study of the feasibility of using Illinois Central's Central Station in downtown Memphis as an intermodal passenger terminal which would accommodate Amtrak, a proposed new light rail system, buses, and airport limousines.



In 1989, railroads purchased about 3.2 billion gallons of diesel fuel at an average price of 56 cents per gallon. By July 15, 1990, the price had dropped to 50 cents. On Aug. 2, Iraq invaded Kuwait—and by Aug. 15 the per gallon cost of diesel fuel had climbed to 82 cents.

Fuel savers: The payoff

A 50% jump in diesel fuel prices has underscored the wisdom of fuel-saving steps taken after the OPEC embargo. Tools are available for new strides in fuel efficiency.

At some point, perhaps after yet another "crisis," U.S. planners may finally realize the folly of depending so heavily upon offshore sources of oil. The current crisis, with the Iraqi invasion of Kuwait, is the third in less than 20 years, and it finds the U.S. with close to 50% dependence upon foreign oil, up from about 30% at the best point after the most recent crisis.

Railroads and railway suppliers have known what was happening and what was likely to happen and have acted to make significant improvements in fuel efficiency.

Fuel availability was one driving factor, availability that could be cut off by another embargo by OPEC nations, especially those in the Persian Gulf region. Fuel price was a second driving factor, with prices peaking at $1 per gallon in 1981 and then slowly dropping to about 50 cents per gallon before rising by 50% or more after the Iraqi thrust into Kuwait. Thus far, since the Aug. 2 invasion, the highest price known to be quoted to a railroad was 98 cents per gallon, but motor carriers were having it even worse if they were buying at the pump, with prices of $1.25 per gallon and more.

Actually, while the fuel price increases were hurting railroads badly, railroads were in much better shape than they would have been 10 or even five years ago to absorb the blow of increased cost.

- **More miles with less fuel.** There are a number of numbers to be considered:

—In 1980, railroads got 235 ton-miles per gallon of fuel. In 1989, railroads got 320 ton-miles per gallon, an increase of more than 36%. Put another way, during that period, railroads reduced fuel consumption by 19% on a 10% increase in ton-miles.

—As a percentage of operating cost, fuel accounts for about 7% for railroads, but about 11.5% for over-the-road motor carriers.

—In total, railroads account for about 2% of the nation's petroleum consumption, while big trucks eat up more than 14%. And railroads, with that lower fuel consumption, produce far more transportation service in terms of ton-miles.

The railroad actually is the most fuel-efficient form of surface transportation, a lot more efficient than trucking and more efficient than barge transportation in many instances when circuitry and movements up-river against the current are considered. Even when comparisons are made against the best that motor carriers can offer today, railroads come off as the most fuel-efficient. Rail double-stack operations, for example, are about 2.5 times as efficient as a

tractor with a 48-foot trailer and 1.7 to 2.1 times as efficient as a tractor with twin-48 trailers.

• **Power plays.** What accounts for the railroad advantage?

—Improved, more fuel-effective motive power from both General Motors' Electro-Motive Division and from General Electric, with Generation II locomotives just coming into the market with their promise of great fuel savings.

—Improved training of locomotive engineers in train-handling techniques designed to help them get the job done with significant savings in fuel.

—Renewed emphasis on the not-so-simple matter of shutting locomotives down when they will not be used rather than letting them idle. This has a fuel-saving benefit. It also has an emissions-reducing benefit, and that's another side of the locomotive-fuel and locomotive-operation story.

Consider first what the locomotive manufacturers have been able to accomplish.

GM-EMD, for example, can show an improvement of about 11% in the fuel efficiency of its 40 Series during the big years of production for those units. Looking back to 1980 and using it as a base-100 year, with the introduction of the 50 Series and then the microprocessor-controlled 60 Series in 1984-85, the fuel-efficiency rating is down to about 85. At the same time, EMD says, the 60 Series locomotives have demonstrated the highest reliability of any series EMD has produced.

How many of the high-efficiency GM-EMD and GE units are in service? A few years ago, the numbers were small. But with deliveries over the past several years and with retirements and sales of older units, a reasonable estimate now is that these high-performance units may account for about 15% of the total Class 1 railroad motive power fleet.

As chief mechanical officers point out, what you get on a load-box isn't necessarily what you get in actual operation, in the real dynamics of train operation.

But Santa Fe's assistant vice president and chief mechanical officer, Doug Sizemore, believes that his road has effective ways to meter and measure and he says that the GM-EMD 60 Series units and the GE Dash 8 units are 17% to 20% more fuel-efficient than the locomotives that were being delivered in the late 1960s and early '70s, for a fuel-efficiency improvement averaging 1% per year for the past 20 years.

That's just for the machine itself—the locomotive—not considering fuel savings made possible by improvements in train-handling and dispatching.

Two leased Oakway EMD SD60s lead eastbound Seattle-Chicago SeaLand double-stacks in Burlington Northern Train No. 8 over summit of Rocky Mountains at Montana's Marias Pass. The EMD-GM 60 Series units, like the GE Dash 8s, are said to be up to 20% more fuel efficient than their predecessors. Photo: Bruce Kelly

But Sizemore believes that more can be done. The locomotive builders' target, he says, should be an improvement of up to 2% per year in fuel efficiency.

Norfolk Southern was the first road to order the GM-EMD 60 Series and GE Dash 8 units when they came onto the market, and NS Vice President-Mechanical Don Mayberry seems reasonably pleased with what these units have done, although he—like other chief mechanical officers—notes that a lot of factors contribute to improvements in fuel efficiency and it's not possible to credit the locomotive alone for improvements.

Like Santa Fe and a number of other roads, NS has a shutdown policy that's enforced for units that aren't going to be used for even fairly short periods of time, and NS also has put in a 50-mph speed limit for freight trains, this done some time ago and not as a result of the current situation on fuel. NS has an engineer-training program that's helping in fuel conservation, and all of the factors coming into play show positive results.

Years ago on Norfolk & Western, Don Mayberry recalls, the ratio of gallons of fuel per 1,000 gross ton-miles was 1.9. In 1983, the ratio was 1.77, and for the first four months of this year it was 1.57 gallons per 1,000 GTM, and NS has had improvements in the ratio in just about every year since '83.

Now, NS has added another weapon to the arsenal, an IITRI TS-2M simulator which is housed in a 38-foot motor home and will be used systemwide for engineer training.

And, as it happens, a number of railroads have been looking at fuel-saving techniques in the training area for a number of years.

As just one example, back in 1981 Burlington Northern put together a fuel-saving training program, using a Train Dynamics Analyzer. BN took the program on the road, and it soon began to see an improvement in fuel-use efficiency that went above 10% per year, savings that have been continued.

That program, almost a decade ago, had locomotive engineers "operating" over their usual territory, then getting training and then operating again. Now, Mike Voelcker, BN's director-technical training, has improved facilities and equipment, and engineer-trainees at Overland Park, Kan., are being taught to do it right the first time, on IITRI simulators.

Train dispatchers could also be trained in ways to pace trains to save fuel, and this is a

Diesel fuel consumption and cost

(Amounts shown in thousands)

Year	United States	East	West	Average Cost Per Gallon (cents)
1955	3,393,103	1,674,646	1,718,457	9.53
1960	3,471,780	1,751,398	1,720,382	9.03
1965	3,742,370	1,873,537	1,868,833	9.10
1970	3,807,663	1,804,939	2,002,724	10.73
1975	3,736,484	1,718,119	2,018,365	30.00
1979	4,080,758	1,754,784	2,325,974	57.60
1980	3,955,996	1,605,715	2,350,281	83.00
1981	3,774,239	1,514,058	2,260,180	100.22
1982	3,178,116	1,291,485	1,886,631	95.43
1983	3,137,295	1,209,892	1,927,403	83.12
1984	3,388,173	1,305,545	2,082,628	82.57
1985	3,144,190	1,221,215	1,922,975	78.34
1986	3,039,069	1,155,010	1,884,059	49.23
1987	3,102,227	1,194,242	1,907,985	53.81
1988	3,182,267	1,175,648	2,006,619	49.15
1989	3,190,815	1,141,006	2,049,809	56.27
1990 (July 15)				50.02
(Aug. 15)				82.00

Source: AAR

part of their training. But existing schedule and train-operation requirements may be limiting what dispatchers can do, and so it may be that real savings will come if and when BN adopts the Rockwell International ARES system for advanced train control.

Watch BN, because more things are going to be happening in this area.

• **A widening arsenal.** Everybody who talks about railroad fuel efficiency and the improvements in mpg ratings talks about the new-generation locomotives as a contributing factor.

But there are many others that are also working to enable railroads to produce more ton-miles per gallon of fuel.

You could look at concrete ties, at improved-geometry turnouts, at rail lubrication, at the increasing use of lighterweight freight cars (mostly aluminum), at improved blocking and dispatching procedures, at better matches of power to trains and, of course, at improved training of operating employees.

Engineer-trainees are instructed in train handling (and fuel-saving) techniques with locomotive simulators. Norfolk Southern's new computer-based IIT Research Institute TS-2M simulator will be housed in a 38-foot motor home.

You could look at what GM's Locomotive Group and GE are putting on locomotives. You could look at what other vendors such as Woodward Governor are putting on locomotives, Woodward with its Complete Locomotive Control (CLC) system which is applicable to GM or GE retrofits or remanufactures.

Railroads need the best that builders and other vendors can produce in order to improve energy efficiency, both to save money and to gain competitive advantage.

But railroads and every other petroleum user will be fighting against the "trading" market that has developed. In the 1970s, oil markets were pretty tightly controlled and were made up of markets with long-term contracts.

Now, as the *Chicago Tribune* recently noted, the New York Mercantile Exchange has become the world's largest energy exchange, and "oil has become the world's largest cash commodity, traded freely and fiercely in a huge spot, or physical market."

Just about everything railroads have done over the past five to 10 years has added to their energy-efficiency advantage.

But what's been done can't be the end of the story. Chief mechanical officers, chief transportation officers, chief executive officers, want to see even better results.

And the environmental problems remain to be addressed, in terms of locomotive efficiency and locomotive emissions.

This could be a killer. In the trucking industry, making engines cleaner has resulted in a loss in efficiency that has to be made up somewhere else. In the automobile industry, manufacturers have been able to meet emission and miles-per-gallon standards only by downsizing cars and reducing weight.

Those things are hard to do, when you're talking about a locomotive.

A railroad locomotive, classed as an off-road diesel vehicle, has not really been regulated except as regards smoke. But this will not last, and railroads, locomotive builders, and sub-system suppliers will have to deal with it. The "dealing" could come first in California, but it will have to be handled elsewhere eventually.

Are equipment manufacturers and training personnel capable of handling the problems that are coming, with regard to fuel supply and price and with regard to emission regulations?

They're working on it. What railroad officers and railway suppliers are trying to accomplish in many ways makes more sense than what government is trying to do. ■